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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/818,670 | 03/28/2001 | Sorcha O'Callaghan | 3446.US.P | 2387 |

56436 7590 05/29/2008

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| EXAMINER | |
|---|---|
| MAIS, MARK A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2619 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 05/29/2008 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/818,670 | O'CALLAGHAN ET AL. | |
| | Examiner | Art Unit | |
| | MARK A. MAIS | 2619 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *03 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *13-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 3, 2008 has been entered.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 13-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (USP 5,917,819).

4. With regard to claim 13, Yang et al. discloses a network switch **[Abstract; Fig. 1, packet switch 8 receives packets which include a header used for determining I/O modules, col. 2, lines 39-51]** comprising:

a look-up engine **[Fig. 1, interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45); translation circuit 18 performs identifier lookup of the packet, col. 2, lines 38-45]** operative to retrieve a port bitmask in response to a header portion of a received packet **[Fig. 3, IOM field 30 and multicast ID 28 are interpreted as a bitmask, col. 3, lines 20-27; Fig. 6, steps 70 and 72 disclose that the interpreted bitmask determines the respective IOM, col. 4, line 64 to col. 5, line 25]** and to forward the received packet only in response to receiving a modified port bitmask **[forwarding the packet to the appropriate IOMs for transmission, col. 1, lines 48-57; Fig. 6, using CID/bitmask lookup table 14 in step 80 (get new CID) for bitmask overlay wherein step 82 (CID's three LSBs each equal "0") constitutes a modification indication, col. 5, line 40 to col. 6, line 3; a sequential operation of multicast block 66 as part of the retrieval followed by step 76 (get port bitmap) and step 80 (get new CID) as parts of the modification necessitates that the processor can only forward the packet after receiving the modification indication, col. 5, line 12 to col. 5, line 18]**;

a network processor operable to perform a processing function **[Fig. 1, interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45); which further performs a processing function]**, in response to at least one of said received packet and said port bitmask, to generate the modified port bitmask **[Fig. 4, CID/bitmask lookup table 14 is referenced and the**

**subsequent CID 48 is overlaid onto the multicast ID, col. 3, line 60 to col. 4, line 12]** and to provide the modified port bitmask to the lookup engine.

Yang et al. does not specifically disclose a look-up engine and the network processor are separate processors **[since they're both interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45)]**. Yang et al. teaches that there is a need for using a port bitmasks for unicasting and/or multicasting and uses a modified port bitmask to forward packets as either single-port-multicast packets or multiport-multicast packets **[Abstract]**. It would have been obvious to separate the two functions to be performed by stand-alone processors because such methodologies have been performed in the past. Specifically, prior to the advent of processors capable of performing multiple super-high-speed functions, stand-alone processors performed simple functions/tasks because these dedicated processors performed these functions faster.

Moreover, figuring out how to perform such a function [header look-up and a processing function] encompasses a finite number of predictable potential solutions to this recognized problem of multicasting/broadcasting functions within a switch. Known solutions include, for example, (1) brute-force parallel processing of each packet and replication for multicast/broadcast packets; (2) stripping all headers from payloads and massive parallel processing of the stripped headers and replicating payloads for multicasting/broadcasting; (3) using Patricia tries for forwarding/routing table processing to reduce processing "costs" (time and money); and (4) creating $2^n$ hash tables using bitmasks to also reduce processing "costs". A person of ordinary skill at the time of the invention could have pursued the known potential solutions with a reasonable expectation of success. Accordingly, it would have been obvious to

one of ordinary skill in the art at the time of the invention to have linked/connected a look-up engine to a network processor to perform port bitmasking functions because such a setup would allow the ATM switch in Yang et al. to map VPI/VCI pairs to specific (plural) ports for unicasting and/or multicasting/broadcasting using port bitmasking while reducing processing "costs" associated with massive parallel processing for all received packets.

5. With regard to claim 22, Yang et al. discloses a network switch **[Abstract; Fig. 1, packet switch 8 receives packets which include a header used for determining I/O modules, col. 2, lines 39-51]** comprising:

receive memory **[Fig. 1, packet 24 received by I/O module 10; col. 2, lines 39-51]** operable to provide a first indication to both lookup hardware and a network processor **[Fig. 1, interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45)]**, said first indication indicating that a received packet is stored in the receive memory **[Abstract; Fig. 1, packet switch 8 receives packets which include a header used for determining I/O modules, col. 2, lines 39-51]**;

look-up hardware **[Fig. 1, interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45); translation circuit 18 performs identifier lookup of the packet, col. 2, lines 38-45]** operable, in response to the first indication, to retrieve data associated with the received packet and further operable to forward the received packet **[Fig. 6, completion of first stage processing of a multicast block 66 including step 70 (setting IOM field) and step 72**

**(assigning multicast ID) with subsequent processing in step 73 (forward to switch fabric), col. 5, lines 15-40]** only in response to receiving modified data associated with the received packet **[forwarding the packet to the appropriate IOMs for transmission, col. 1, lines 48-57; Fig. 6, using CID/bitmask lookup table 14 in step 80 (get new CID) for bitmask overlay wherein step 82 (CID's three LSBs each equal "0") constitutes a modification indication, col. 5, line 40 to col. 6, line 3; a sequential operation of multicast block 66 as part of the retrieval followed by step 76 (get port bitmap) and step 80 (get new CID) as parts of the modification necessitates that the processor can only forward the packet after receiving the modification indication, col. 5, line 12 to col. 5, line 18]**;

a network processor **[Fig. 1, interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45)]** operable to perform a processing function **[Fig. 1, interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45); which further performs a processing function]**, in response to at least said first indication **[Fig. 4, CID/bitmask lookup table 14 is referenced and the subsequent CID 48 is overlaid onto the multicast ID, col. 3, line 60 to col. 4, line 12]**, to generate the modified data associated with the received packet and to provide the modified data to the lookup hardware **[Fig. 6, using CID/bitmask lookup table 14 in step 80 (get new CID) for bitmask overlay wherein step 82 (CID's three LSBs each equal "0") constitutes a second function indication, col. 5, line 40 to col. 6, line 3]**.

Yang et al. does not specifically disclose a look-up engine and the network processor are separate processors **[since they're both interpreted as the combination of the translation**

**circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45)]**. Yang et al. teaches that there is a need for using a port bitmasks for unicasting and/or multicasting and uses a modified port bitmask to forward packets as either single-port-multicast packets or multiport-multicast packets **[Abstract]**. It would have been obvious to separate the two functions to be performed by stand-alone processors because such methodologies have been performed in the past. Specifically, prior to the advent of processors capable of performing multiple super-high-speed functions, stand-alone processors performed simple functions/tasks because these dedicated processors performed these functions faster.

Moreover, figuring out how to perform such a function [header look-up and a processing function] encompasses a finite number of predictable potential solutions to this recognized problem of multicasting/broadcasting functions within a switch. Known solutions include, for example, (1) brute-force parallel processing of each packet and replication for multicast/broadcast packets; (2) stripping all headers from payloads and massive parallel processing of the stripped headers and replicating payloads for multicasting/broadcasting; (3) using Patricia tries for forwarding/routing table processing to reduce processing "costs" (time and money); and (4) creating $2^n$ hash tables using bitmasks to also reduce processing "costs". A person of ordinary skill at the time of the invention could have pursued the known potential solutions with a reasonable expectation of success. Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have linked/connected a look-up engine to a network processor to perform port bitmasking functions because such a setup would allow the ATM switch in Yang et al. to map VPI/VCI pairs to specific (plural) ports for

unicasting and/or multicasting/broadcasting using port bitmasking while reducing processing "costs" associated with massive parallel processing for all received packets.

6. With regard to claim 14, Yang et al. discloses that each of said lookup engine and said network processor receive a first indication that the packet has been received **[Abstract; Fig. 1, packet switch 8 receives packets which include a header used for determining I/O modules, col. 2, lines 39-51]**.

7. With regard to claim 15, Yang et al. discloses that the look-up engine provides for said network processor a second indication, said second indication indicating that said port bitmask has been obtained **[Fig. 6, completion of first stage processing of a multicast block 66 including step 70 (setting IOM field) and step 72 (assigning multicast ID) with subsequent processing in step 73 (forward to switch fabric), col. 5, lines 15-40]**.

8. With regard to claim 16, Yang et al. discloses that the network processor is operative, in response to said first indication, to execute said processing function **[Fig. 4, CID/bitmask lookup table 14 is referenced and the subsequent CID 48 is overlaid onto the multicast ID, col. 3, line 60 to col. 4, line 12]** and to provide to said look-up engine a third indication, said third indication indicating that said processing function has been executed **[Fig. 6, using CID/bitmask lookup table 14 in step 80 (get new CID) for bitmask overlay wherein step 82 (CID's three LSBs each equal "0") constitutes a second function indication, col. 5, line 40 to col. 6, line 3]**.

9. With regard to claim 17, Yang et al. discloses that the network processor performs the processing function in parallel with the retrieving by the lookup engine **[inherent]**.

10. With regard to claim 18, Yang et al. discloses that the lookup engine forward a plurality of copies of the received packet, each of the plurality of copies in response to one of a plurality of modified port bitmasks provided by the network processor **[Fig. 4, CID/bitmask lookup table 14 is referenced and the subsequent CID 48 is overlaid onto the multicast ID, col. 3, line 60 to col. 4, line 12]**.

11. With regard to claim 19, Yang et al. discloses that the lookup engine retrieve a port bitmask for a next received packet only after receiving said third indication**[Fig. 6, using CID/bitmask lookup table 14 in step 80 (get new CID) for bitmask overlay wherein step 82 (CID's three LSBs each equal "0") constitutes a second function indication, col. 5, line 40 to col. 6, line 3]**.

12. With regard to claim 20, Yang et al. discloses that the third indication is said modified bitmask **[Fig. 6, using CID/bitmask lookup table 14 in step 80 (get new CID) for bitmask overlay wherein step 82 (CID's three LSBs each equal "0") constitutes a second function indication, col. 5, line 40 to col. 6, line 3]**..

13. With regard to claim 21, Yang et al. discloses that the third indication is sent based on a

value of a replication pointer **[Abstract; mapping VPI/VCI pairs to specific (plural) ports for unicasting and/or multicasting/broadcasting using port bitmasking]**.

***Response to Arguments***

14. Applicant's arguments filed on March 3, 2008 have been fully considered but they are not persuasive.

15. With respect to claims 13 and 22, Applicants state that Yang et al. fails to disclose a lookup engine which retrieves a port bitmask (claim 13) or data associated with a received packet (claim 22) **[See Applicants' Amendment dated March 3, 2008, page 5, paragraph 6 to page 6, paragraph 1]**. Applicants argue, apparently, that the lookup engine and the network processor are so interlocked that the lookup engine cannot forward a packet until released by the network processor (after the network processor has executed a processing function) **[See Applicants' Amendment dated March 3, 2008, page 6, paragraph 1]**. The examiner respectfully disagrees.

16. As noted in the rejection of claim 13 above, Yang et al. discloses forwarding the packet to the appropriate IOMs for transmission **[col. 1, lines 48-57]**. Using CID/bitmask lookup table 14 in step 80 (get new CID) for bitmask overlay wherein step 82 (CID's three LSBs each equal "0") constitutes a modification indication **[Fig. 6, col. 5, line 40 to col. 6, line 3]**. A sequential operation of multicast block 66 as part of the retrieval followed by step 76 (get port bitmap) and

step 80 (get new CID) as parts of the modification necessitates that the processor can only forward the packet after receiving the modification indication **[Fig. 6, col. 5, line 12 to col. 5, line 18]**.

17. Applicants state that Yang et al. fails to disclose a lookup engine and a network processor connected in a specific configuration **[See Applicants' Amendment dated March 3, 2008, page 6, paragraph 2]**. The examiner respectfully disagrees.

18. As noted in the rejection of claim 13 above, Yang et al. does not specifically disclose a look-up engine and the network processor are separate processors **[since they're both interpreted as the combination of the translation circuit 18 with identifier table 20 (col. 2, lines 38-45) and the CID/bitmask lookup table 14 (col. 2, lines 38-45)]**. Yang et al. teaches that there is a need for using a port bitmasks for unicasting and/or multicasting and uses a modified port bitmask to forward packets as either single-port-multicast packets or multiport-multicast packets **[Abstract]**. It would have been obvious to separate the two functions to be performed by stand-alone processors because such methodologies have been performed in the past. Specifically, prior to the advent of processors capable of performing multiple super-high-speed functions, stand-alone processors performed simple functions/tasks because these dedicated processors performed these functions faster.

Moreover, figuring out how to perform such a function [header look-up and a processing function] encompasses a finite number of predictable potential solutions to this recognized problem of multicasting/broadcasting functions within a switch. Known solutions include, for

example, (1) brute-force parallel processing of each packet and replication for multicast/broadcast packets; (2) stripping all headers from payloads and massive parallel processing of the stripped headers and replicating payloads for multicasting/broadcasting; (3) using Patricia tries for forwarding/routing table processing to reduce processing "costs" (time and money); and (4) creating $2^n$ hash tables using bitmasks to also reduce processing "costs". A person of ordinary skill at the time of the invention could have pursued the known potential solutions with a reasonable expectation of success. Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have linked/connected a look-up engine to a network processor to perform port bitmasking functions because such a setup would allow the ATM switch in Yang et al. to map VPI/VCI pairs to specific (plural) ports for unicasting and/or multicasting/broadcasting using port bitmasking while reducing processing "costs" associated with massive parallel processing for all received packets.

## *Conclusion*

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

(a) Bernheim et al. (USP 7,286,497), Look up table for QRT.

(b) Kurokawa et al. (USP 7,103,043), Packet transmission apparatus.

(c) Boivie (USP 7,079,501), Method and system for efficiently delivering content to multiple requesters.

(d) Garcia-Luna-Aceves et al. (USP 7,031,308), Tree-based ordered multicasting method.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARK A. MAIS whose telephone number is (571)272-3138. The examiner can normally be reached on M-Th 5am-4pm.

21. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wing F. Chan can be reached on 571-272-7493. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

22. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wing F. Chan/
Supervisory Patent Examiner, Art Unit 2619
5/27/08

May 8, 2008

/Mark A. Mais/

Examiner, Group Art Unit 2619